

Claims

1. A process for the manufacture of beadlet preparations of fat-soluble substances in a water-soluble or water-dispersible non-gelling matrix, which process comprises  
(a) feeding in the upper section of a vertical spray tower, through a spray nozzle an  
5 aqueous emulsion of said fat-soluble substance(s) and said matrix component, and, through separate inlets, powderous starch and a stream of hot air,  
(b) feeding in the lower section of said spray tower a stream of cold air to form a fluidized bed of starch-covered beadlets comprising said matrix component said fat-soluble substances, and  
10 (c) collecting said beadlets from the fluidized bed and discharging them to a dryer.
2. A process as in claim 1 wherein the spray zone has a temperature of about 40 °C to about 200 °C, preferably about 60 °C to about 120 °C and the fluidized bed has a temperature of about 0 °C to about 40 °C, preferably about 5 to about 20 °C.
3. A process as in claim 1 or 2 wherein the aqueous emulsion, starch and a stream of hot  
15 air is fed into the spraying tower through an arrangement of nozzles substantially as shown in Figure 2 and comprising  
(a) a first, hollow cone the upper and wider end of which is closed and carries one or more inlets for a starch/air dispersion;  
(b) a second, inner cone fitted into the first, hollow outer cone in such a manner that it  
20 points in upward direction into said first cone, leaving at its end a small circular slot between its outer surface and the inner surface of the first cone;  
(c) a inlet tube with closed end and rotary atomizer protruding in downward direction over the second cone and ending with a rotary atomizer or pressure atomizer; and  
(d) a circular air inlet channel surrounding the outer cone and ending slightly above the  
25 circular slot that is formed by the cones.
4. A process as in any one claims 1-3 wherein the matrix component is a lignin derivative.
5. A process as in claim 4 wherein the lignin derivative is a lignin sulfonate.  
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6. A process as in any one of claims 1-5 wherein the fat-soluble substance is vitamin A, D, E and K, a carotenoid, a polyunsaturated fatty acid, an oil or a fat.
7. A process as in any one of claims 1-5 wherein the fat-soluble substance is  $\beta$ -carotene,  
35 astaxanthin, apocarotenal, canthaxanthin, apoester, citranaxanthin or zeaxanthin.

8. An arrangement of nozzles substantially as shown in Figure 2, and comprising
- (a) a first, hollow cone the upper and wider end of which is closed and carries one or more inlets for a starch/air dispersion;
  - (b) a second, inner cone fitted into the first, hollow outer cone in such a manner that it  
5 points in upward direction into said first cone, leaving at its end a small circular slot between its outer surface and the inner surface of the first cone;
  - (c) a rotating inlet tube with closed end and small side openings protruding in downward direction over the second cone and ending with a rotary atomizer or pressure atomizer; and
  - 10 (d) a circular air inlet channel surrounding the outer cone and ending slightly above the circular slot that is formed by the cones.

9. The invention as described hereinbefore especially with reference to the Example and the drawings.